Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes

Indiana, 1994-1998

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Abstract

Objective: This study examined the effect of short (<12 months) interpregnancy intervals on the risks for low birth weight (<2,500 g), preterm birth (<37 weeks), and small size for gestational age (SGA, birth weight <10 percentile for the gestational age and sex of infant).

Method: The source of data was the birth certificates of singleton infants born alive to multiparous mothers in Indiana from 1994 to 1998. Interpregnancy interval was computed by subtracting gestational age from the interval between the last two consecutive deliveries. Intervals were computed in weeks and were converted to months (13 weeks = 3 months). Interpregnancy intervals of less than 24 months were divided into 3-month intervals to ascertain the magnitude of adverse pregnancy outcomes associated with various intervals. Statistical analyses were done by multiple logistic regression to examine the effect of short interpregnancy intervals on birth outcomes, controlling for a number of sociodemographic (maternal age, education, and marital status), health behavior (initiation of prenatal care and smoking), and reproductive history (parity and previous high risk births) variables.

Results: Among all singleton live births to multiparous mothers in Indiana between 1994 and 1998 (N=202,794), 18.8% were conceived in less than 12 months, 6.2% in less than 6 months, and 1.8% in less than 3 months following the previous live births. The prevalence of very short interpregnancy intervals (<3 months and 3-5.9 months) was considerably higher among blacks (3.3% and 7.3%) and Hispanics (3.5% and 6.4%) compared to non-Hispanic whites (1.5% and 4.3%). The risks of adverse birth outcomes were lowest among infants born after an 18-23 month interpregnancy interval; shorter intervals were associated with higher risks. These associations persisted when effects of 9 demographic, behavioral, and health risk factors were controlled. Compared to infants conceived 18-23 months after the previous live births, infants conceived in less than 3 months were at 52% higher risk of being low birth weight, 62% higher risk of preterm birth, and 43% higher risk of being SGA. Higher risks for adverse birth outcomes continued to be statistically significant for interpregnancy interval of 3-5.9 and up to 6-8.9 months. Infants conceived after 3-8.9 months following the previous live birth were 30-37% more likely to be low birth weight, 19-20% more likely to be preterm, and 24-33% more likely to be SGA compared to infants born after an interval of 18-23 months.

Conclusion: The adverse effects of short interpregnancy intervals on birth outcomes were most noticeable among births after an interpregnancy interval of less than 3 months. However, the higher risk of adverse outcomes continued to exist for interpregnancy intervals of up to 9 months. Therefore, efforts of public health agencies to improve family planning could continue beyond 3 months postpartum as a measure to reduce short interpregnancy interval and to improve birth outcomes. Higher prevalence of short interpregnancy intervals among black and Hispanic mothers warrants special attention and allocation of resources to improve birth spacing among the minorities.

Highlights

- Among all singleton live births to multiparous mothers in Indiana between 1994 to 1998, 18.8% were conceived in less than 12 months, 6.2% in less than 6 months, and 1.8% in less than 3 months following the previous live birth.

- The percentage of mothers with very short interpregnancy intervals (less than 3 months and 3-5.9 months) were considerably higher among blacks (3.3% and 7.3%) and Hispanics (3.5% and 6.4%) compared to non-Hispanic whites (1.5% and 4.3%).

- For teen (less than 20 years of age) multiparous mothers, the prevalence of very short interpregnancy interval (less than 6 months) was similar among non-Hispanic whites (21.5%) and blacks (21.7%) and was somewhat higher among Hispanics (27.7%). For adult mothers, however, both blacks and Hispanics had considerably higher prevalence of short interpregnancy intervals (8.7% and 7.9%) compared to non-Hispanic whites (4.9%).

- The prevalence of very short interpregnancy interval (<6 months) among single mothers (9.6%) was almost twice that of married mothers (5.0%).

- Among mothers with less than high school education, 11.4% had interpregnancy intervals of less than 6 months compared to 4.0% among mothers with some college education.

- The percentage of mothers with short interpregnancy interval was higher among those who had 3 or more previous live births (8.5%) than among those with one or two previous live births (5.7%), and was higher among smokers (7.7%) compared to non-smokers (5.7%).

- Compared to mothers with an optimum interpregnancy interval (18-23.9 months), mothers with short intervals (less than 6 months) were more likely to be black, Hispanic, teenager, less educated, unmarried, smoker, of high parity and with previous high risk birth outcome.

- As interpregnancy intervals increased from less than 3 months to 21-23.9 months, the percentages of low birth weight decreased from 8.8% to 3.9%, the percentages of preterm births decreased from 16% to 8%, and the percentages of SGA births decreased from 12.5% to 6.8%.

- The prevalence of adverse birth outcomes was similar between non-Hispanic whites and Hispanics across all interpregnancy intervals. For blacks, however, the prevalence of low birth weight, preterm birth, and SGA were consistently and considerably higher compared to non-Hispanic whites and Hispanics regardless of the interpregnancy interval.

- Controlling for the potentially important confounders (maternal age, education, marital status, parity, smoking status, initiation of prenatal care, previous high risk birth), interpregnancy interval of less than 3 months increased the risks of low birth weight, preterm birth, and SGA birth by 53%, 63%, and 47%, respectively.

- The magnitude of the risks for adverse birth outcomes diminished as interpregnancy intervals increased. However, at interpregnancy intervals of 3-5.9 months and 6-8.9 months, the risks for low birth weight, preterm birth, and SGA birth were still significantly higher (by 19-37%) compared to births after and interpregnancy interval of 18-23.9 months.

Table 1. Number and percent distribution of singleton live births to multipasrous mothers according to interpregnancy intervals by race and Hispanic origin of mother: Indiana, 1994-1998

Race and Hispanic Origin	All births	Interpregnancy interval, mo								
		<3	3-5.9	6-8.9	9-11.9	12-14.9	15-17.9	18-20.9	21-23.9	24+
					Number					
All races[1]	202,794	3,703	8,793	11,953	13,749	14,421	13,664	12,717	11,996	111,798
White, total	181,642	2,948	7,388	10,373	12,276	13,058	12,469	11,582	10,994	100,554
White, non-Hispanic	174,483	2,691	6,975	9,886	11,762	12,549	12,047	11,193	10,620	96,760
Black[2]	21,152	755	1,405	1,580	1,473	1,363	1,195	1,135	1,002	11,244
Hispanic	7,217	261	417	490	517	517	424	394	378	3,819
					Percent					
All races	100.0	1.8	4.3	5.9	6.8	7.1	6.7	6.3	5.9	55.1
White, total	100.0	1.6	4.1	5.7	6.8	7.2	6.9	6.4	6.1	55.4
White, non-Hispanic	100.0	1.5	4.0	5.7	6.7	7.2	6.9	6.4	6.1	55.5
Black	100.0	3.6	6.6	7.5	7.0	6.4	5.6	5.4	4.7	53.2
Hispanic	100.0	3.6	5.8	6.8	7.2	7.2	5.9	5.5	5.2	52.9

[1]Excludes races other than black and white.

[2]Blacks are 99.7 percent non-Hispanic.

Table 2. Maternal characteristics according to interpregnancy interval among singleton live births to multiparous mothers: Indiana, 1994-1998

Maternal characteristic	Interpregnancy interval, mo							
	<3	3-5.9	6-8.9	9-11.9	12-14.9	15-17.9	18-20.9	21-23.9
	Percent							
Race and Hispanic origin								
White, non-Hispanic	72.7	79.3	82.7	85.6	87.0	88.2	88.0	88.5
Black[1]	20.3	15.9	13.2	10.7	9.4	8.7	8.9	8.3
Hispanic	7.0	4.8	4.1	3.7	3.6	3.1	3.1	3.2
Age (years)								
<20	20.3	15.8	12.1	9.6	7.7	6.6	5.4	4.7
20-34	76.0	79.0	81.4	82.9	83.9	85.1	85.7	86.4
>=35	3.7	5.2	6.5	7.5	8.4	8.3	8.9	8.9
Education (years)								
<12	37.1	34.0	28.2	25.1	22.5	20.1	18.6	16.9
12	39.9	37.1	35.7	35.3	34.2	35.5	34.7	36.5
>12	23.0	28.9	36.1	39.6	43.3	44.4	46.7	46.6
Marital status								
Married	54.7	63.6	70.0	75.0	77.6	78.3	78.1	80.0
Not married	45.3	36.4	30.0	25.0	22.4	21.7	21.9	20.0
Parity >3								
Yes	22.6	22.1	21.6	19.8	18.7	17.4	16.3	15.4
No	77.4	77.9	78.4	80.2	81.3	82.6	83.7	84.6
Previous high risk pregnancy								
Yes	11.1	9.9	9.2	8.8	8.6	8.5	8.5	8.4
No	88.9	90.1	90.8	91.2	91.4	91.5	91.5	91.6
Smoked during pregnancy								
Yes	31.0	29.7	25.6	22.0	20.7	19.9	19.6	19.7
No	69.0	70.3	74.4	78.0	79.3	80.1	80.4	80.3
Trimester prenatal care began								
First	54.1	59.5	66.7	71.9	75.0	78.0	79.5	82.3
Second	30.7	28.8	24.6	21.0	19.3	17.5	16.4	14.1
Third or never	15.2	11.7	8.7	7.1	5.7	4.5	4.1	3.6

[1]Blacks are 99.7 percent non-Hispanic.

Table 3. Prevalence of low birth weight, preterm birth, and small for gestational age according to interpregnancy interval by race and Hispanic origin of mother among singleton live births to multiparous mothers: Indiana, 1994-1998

Race and Hispanic origin	Interpregnancy interval, mo							
	<3	3-5.9	6-8.9	9-11.9	12-14.9	15-17.9	18-20.9	21-23.9
	Percent							
All races[1]								
Low birth weight	8.8	7.2	6.2	4.7	4.5	4.3	4.0	3.9
Preterm birth	16.0	11.4	10.5	9.6	9.8	8.7	8.0	7.8
SGA	12.5	11.0	9.5	7.6	7.1	6.8	6.8	6.4
White, non-Hispanic								
Low birth weight	7.3	6.2	5.0	4.0	3.9	3.8	3.5	3.4
Preterm birth	13.5	9.9	8.9	8.1	8.6	7.9	7.3	6.9
SGA	11.3	10.0	8.3	7.0	6.3	6.1	6.2	5.8
Black[2]								
Low birth weight	14.7	12.7	13.4	10.6	10.5	9.8	9.3	9.4
Preterm birth	25.6	18.9	20.6	19.8	20.2	17.0	15.1	15.7
SGA	18.0	16.3	17.0	12.8	14.1	13.1	12.5	12.7
Hispanic								
Low birth weight	7.3	6.0	6.1	5.0	4.1	4.7	3.1	2.9
Preterm birth	13.8	11.0	10.2	13.4	10.3	9.0	9.1	10.6
SGA	9.6	9.1	9.2	6.4	6.8	6.6	8.1	5.8

[1]Excludes races other than black and white.

[2]Blacks are 99.7 percent non-Hispanic.

Table 4. Logistic regression analysis of the association between interpregnancy intervals and low birth weight, preterm birth, and small for gestational age among singleton live births to multiparous mothers: Indiana, 1994-1998[1]

Interpregnancy Interval (mo)	Low birth weight		Preterm birth		Small for gestational age	
	OR[2]	95% CI[2]	OR	95% CI	OR	95% CI
<3	1.52	1.33-1.75	1.62	1.46-1.79	1.43	1.27-1.60
3-5.9	1.37	1.23-1.52	1.20	1.10-1.30	1.33	1.22-1.45
6-8.9	1.30	1.17-1.44	1.19	1.10-1.28	1.24	1.15-1.35
9-11.9	1.08	0.97-1.20	1.15	1.07-1.24	1.06	0.98-1.15
12-14.9	1.08	0.98-1.20	1.22	1.14-1.32	1.03	0.95-1.12
15-17.9	1.06	0.96-1.18	1.10	1.02-1.19	1.01	0.93-1.10
18-23.9	1.00		1.00		1.00	

[1]Adjusted for maternal race and Hispanic origin, age at last delivery, education, marital status, parity, inititaion of prenatal care, smoking, and outcome of previous live birth.
[2]OR=odds ratio, CI=confidence interval

Figure 1.

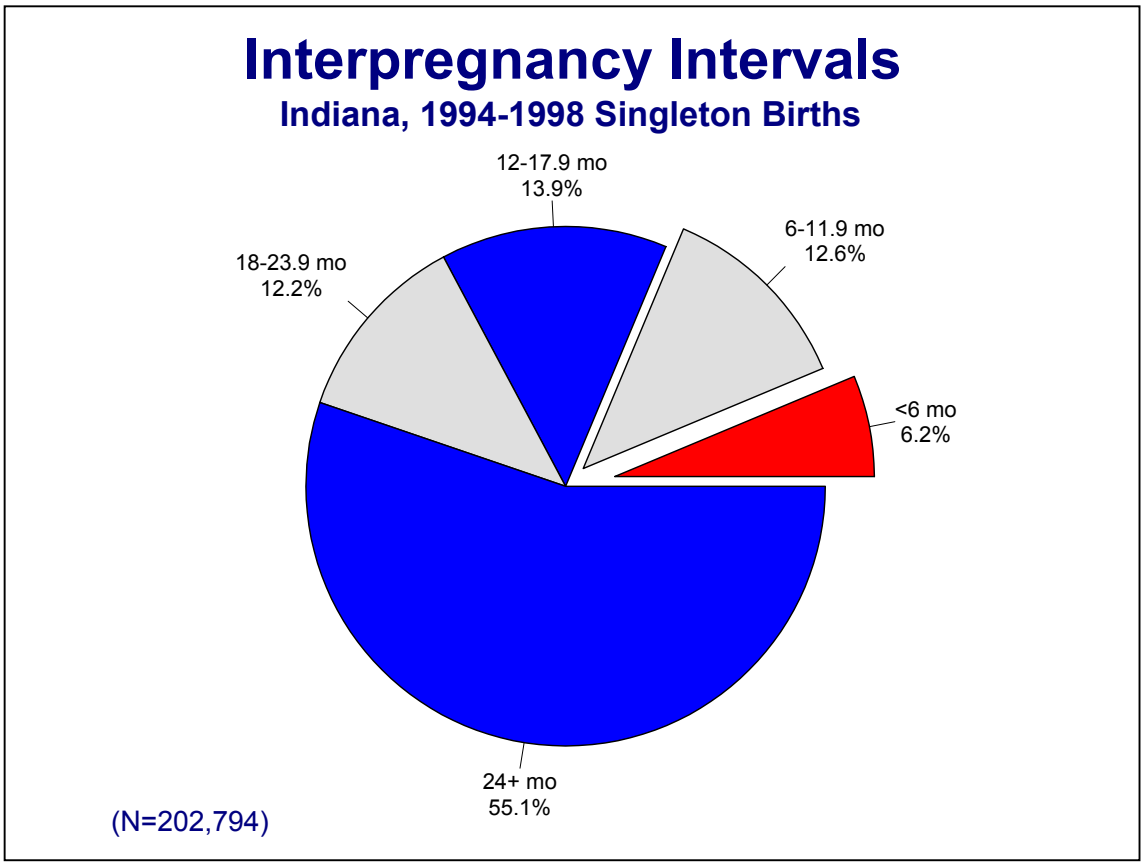
Interpregnancy Intervals
Indiana, 1994-1998 Singleton Births
12-17.9 mo
13.9%
6-11.9 mo
12.6%
18-23.9 mo
12.2%
<6 mo
6.2%
24+ mo
55.1%
(N=202,794)

Figure 2.

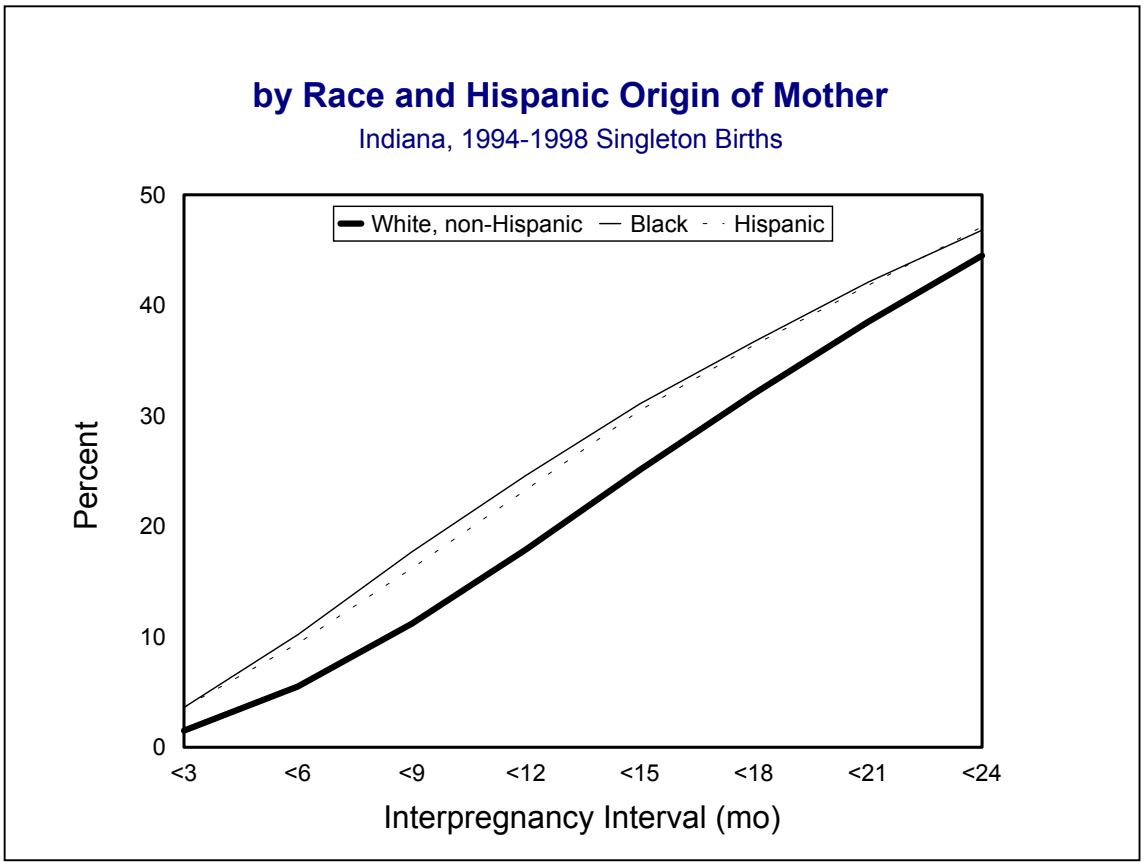
by Race and Hispanic Origin of Mother
Indiana, 1994-1998 Singleton Births
White, non-Hispanic
Black
Hispanic
Percent
50
40
30
20
10
0
<3
<6
<9
<12
<15
<18
<21
<24
Interpregnancy Interval (mo)

Figure 3.

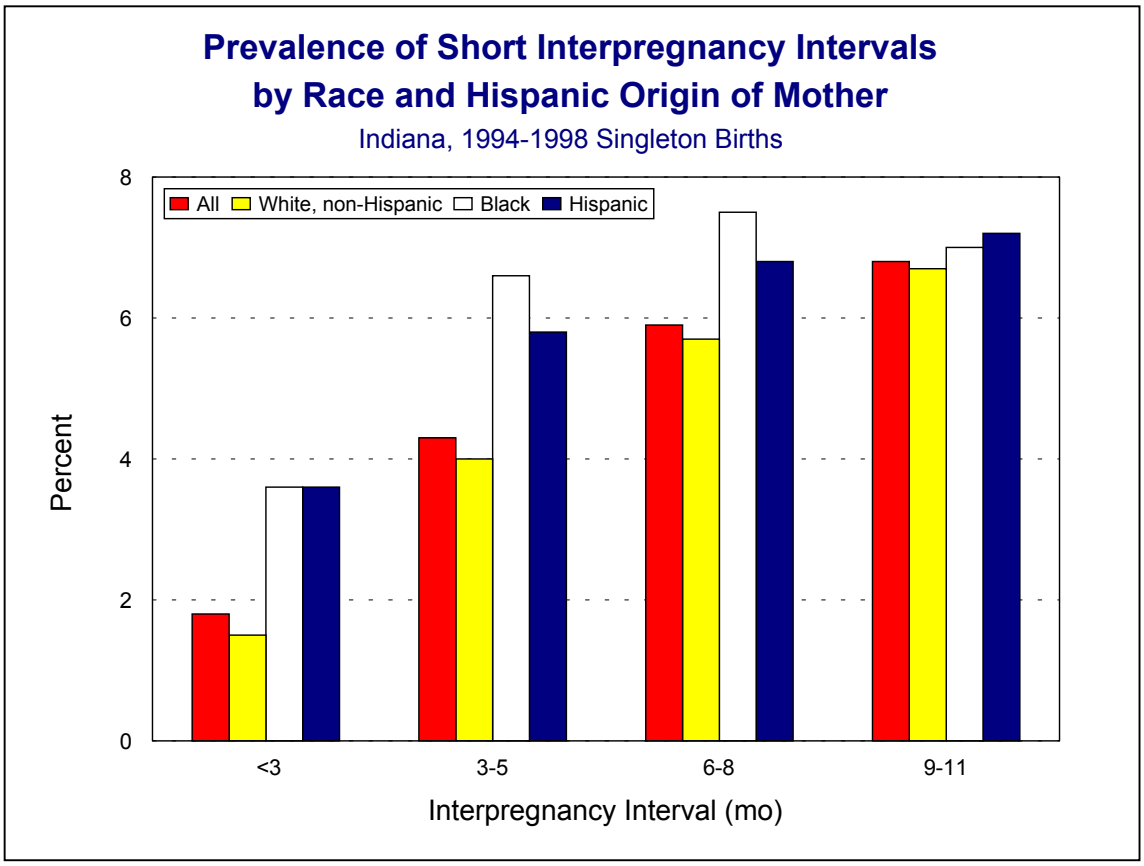
Prevalence of Short Interpregnancy Intervals
by Race and Hispanic Origin of Mother
Indiana, 1994-1998 Singleton Births
All
White, non-Hispanic
Black
Hispanic
Percent
0
2
4
6
8
<3
3-5
6-8
9-11
Interpregnancy Interval (mo)

Figure 4.

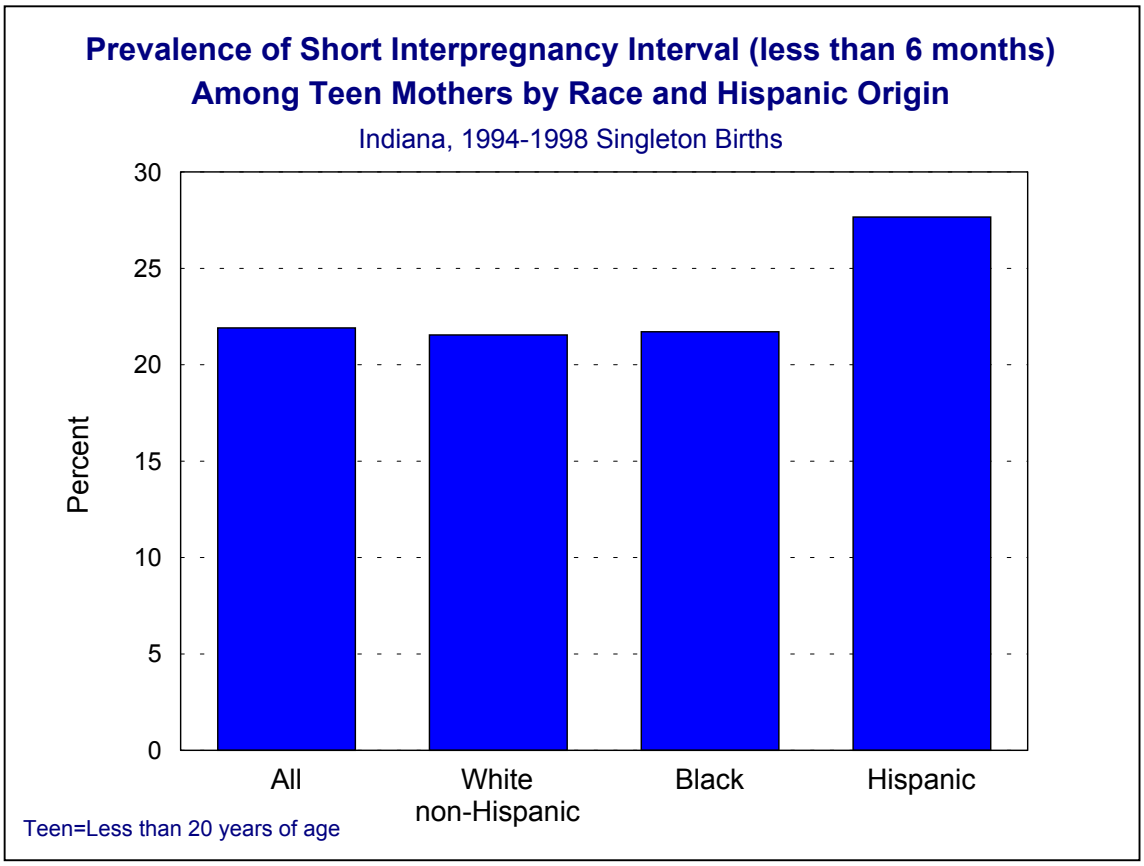
Prevalence of Short Interpregnancy Interval (less than 6 months)
Among Teen Mothers by Race and Hispanic Origin
Indiana, 1994-1998 Singleton Births
Percent
30
25
20
15
10
5
0
All
White non-Hispanic
Black
Hispanic
Teen=Less than 20 years of age

Figure 5.

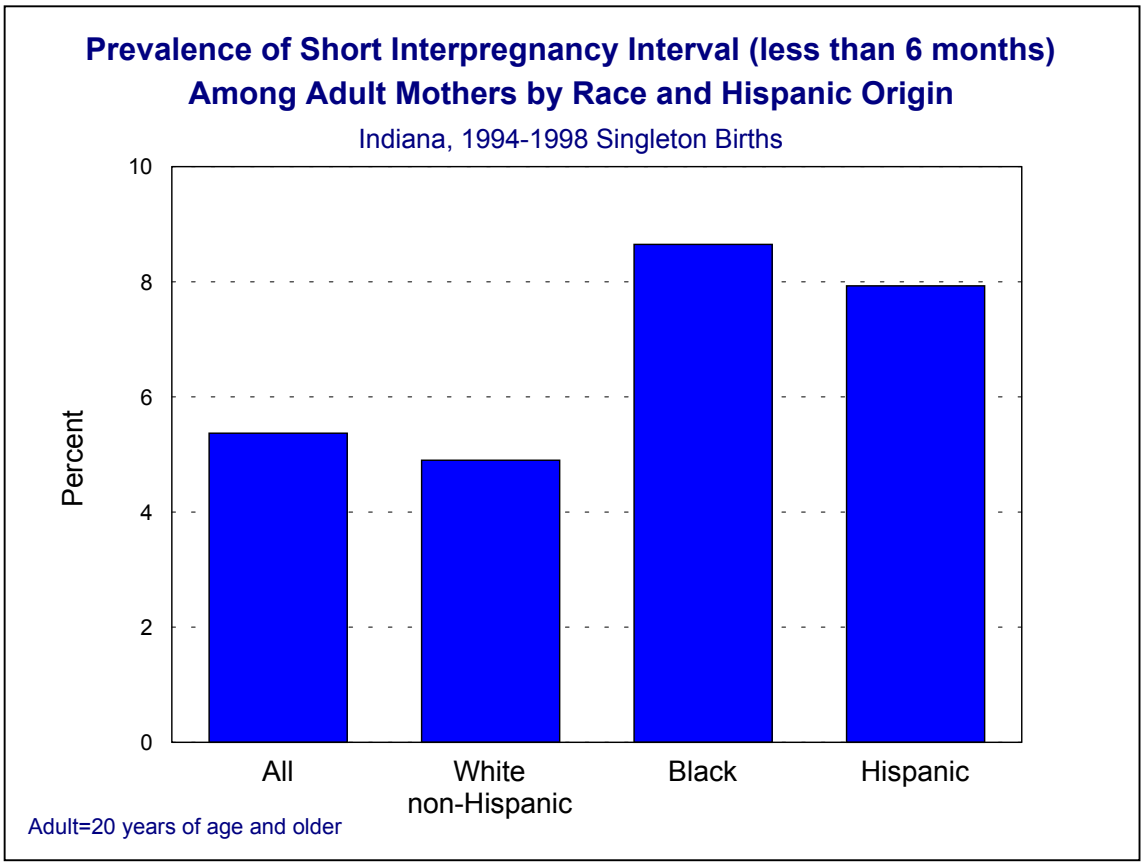
Prevalence of Short Interpregnancy Interval (less than 6 months)
Among Adult Mothers by Race and Hispanic Origin
Indiana, 1994-1998 Singleton Births
Percent
10
8
6
4
2
0
All
White non-Hispanic
Black
Hispanic
Adult=20 years of age and older

Figure 6.

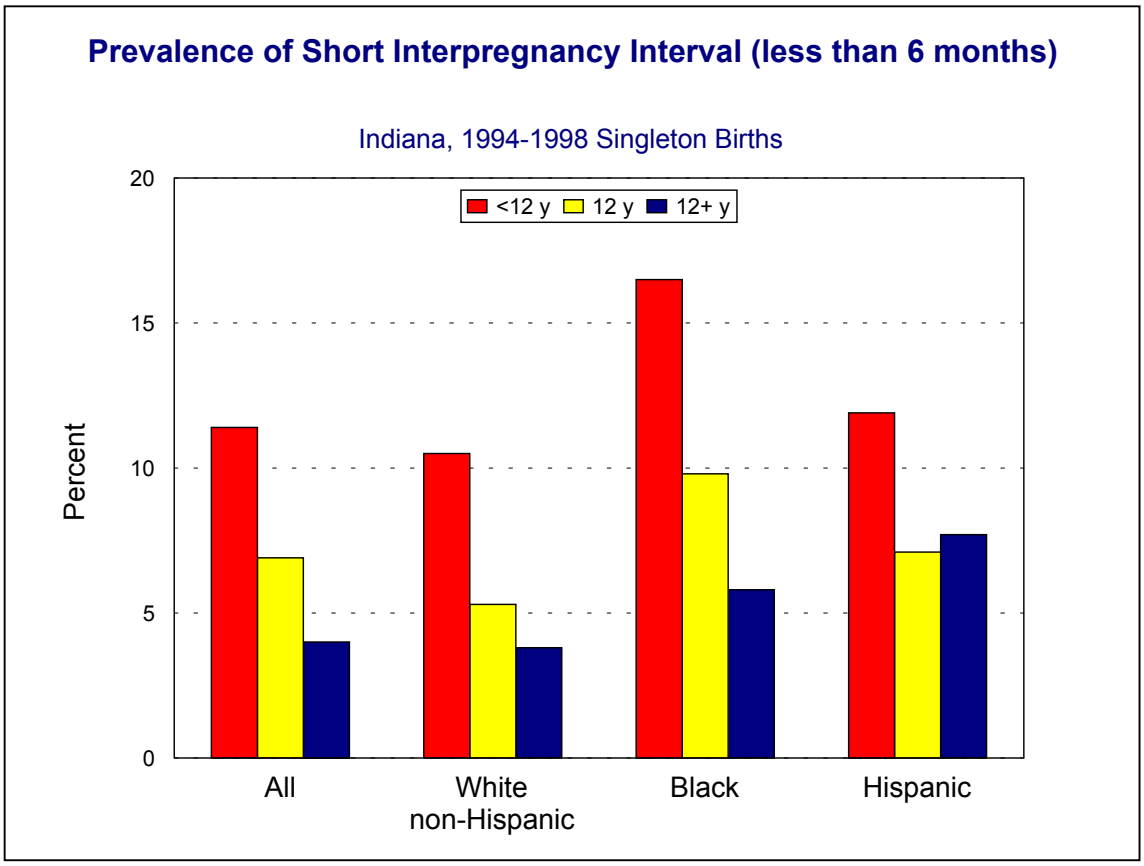
Prevalence of Short Interpregnancy Interval (less than 6 months)
Indiana, 1994-1998 Singleton Births
<12 y
12 y
12+ y
Percent
20
15
10
5
0
All
White non-Hispanic
Black
Hispanic

Figure 7.

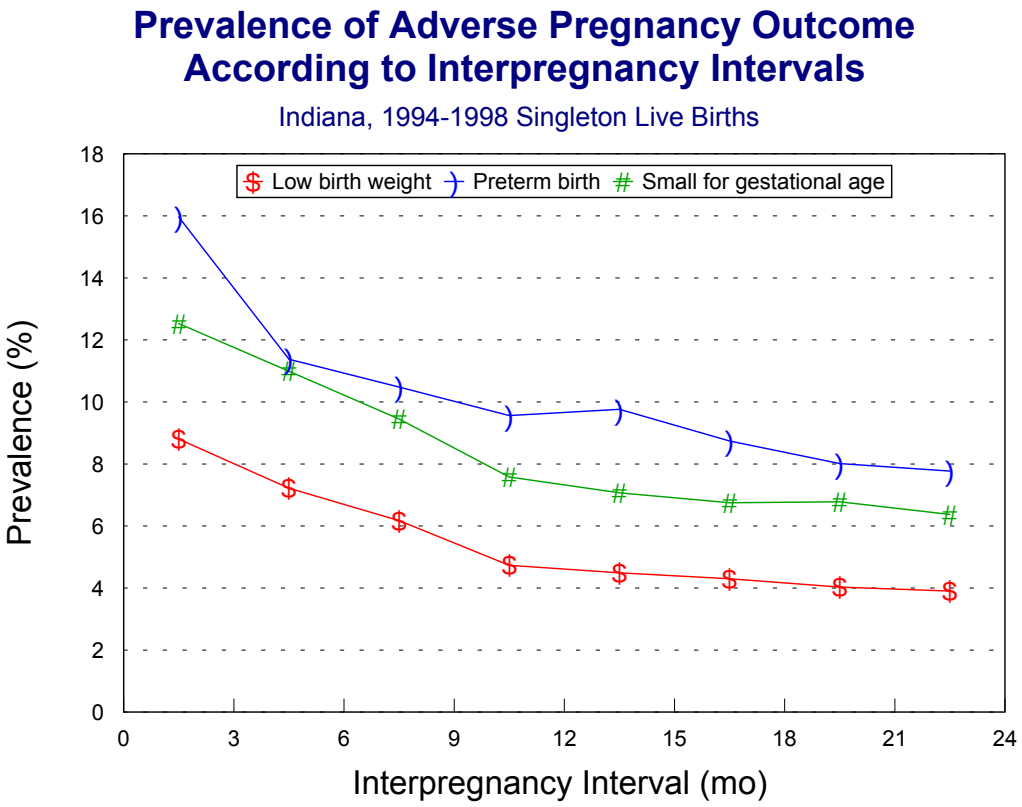
Prevalence of Adverse Pregnancy Outcome
According to Interpregnancy Intervals
Indiana, 1994-1998 Singleton Live Births
$ Low birth weight) Preterm birth # Small for gestational age
Prevalence (%)
0
2
4
6
8
10
12
14
16
18
0
3
6
9
12
15
18
21
24
Interpregnancy Interval (mo)

Figure 8.

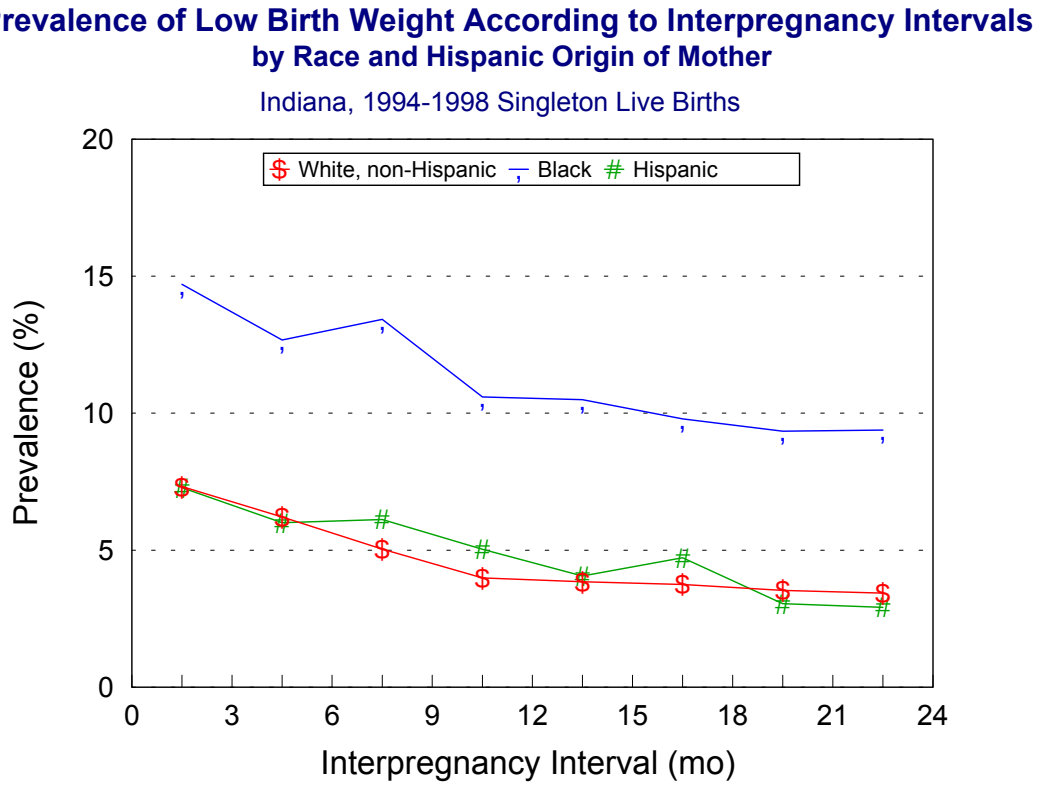
Prevalence of Low Birth Weight According to Interpregnancy Intervals
by Race and Hispanic Origin of Mother
Indiana, 1994-1998 Singleton Live Births
$ White, non-Hispanic , Black # Hispanic
Prevalence (%)
20
15
10
5
0
0
3
6
9
12
15
18
21
24
Interpregnancy Interval (mo)

Figure 9.

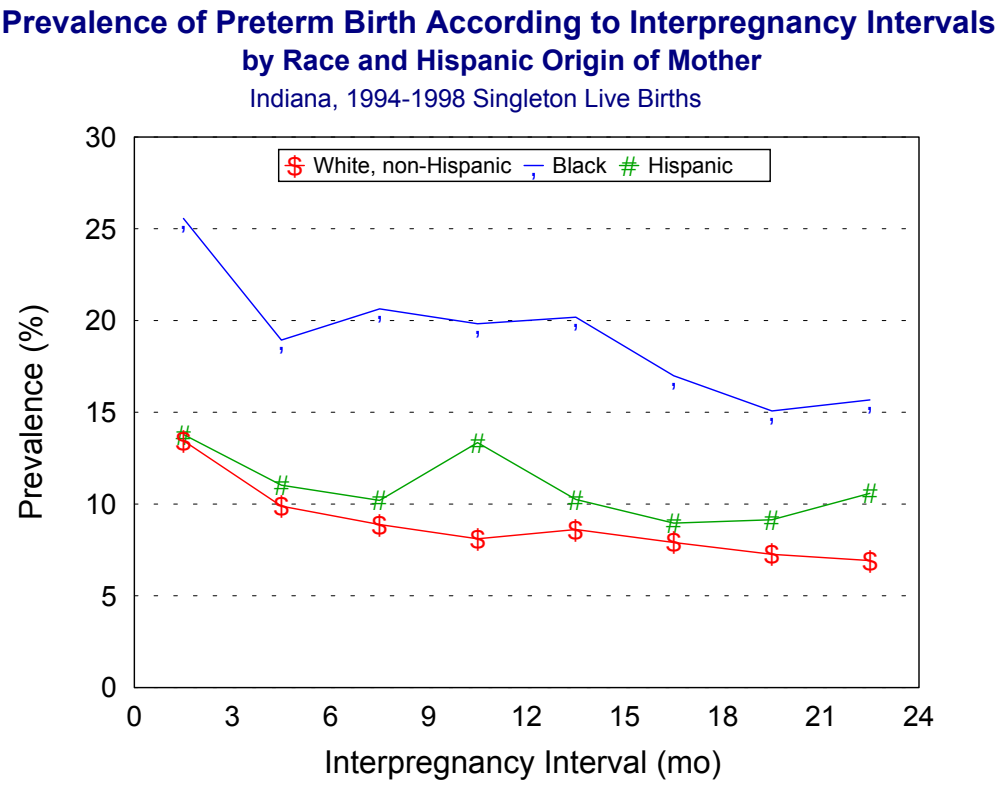
Prevalence of Preterm Birth According to Interpregnancy Intervals
by Race and Hispanic Origin of Mother
Indiana, 1994-1998 Singleton Live Births
$ White, non-Hispanic , Black # Hispanic
Prevalence (%)
30
25
20
15
10
5
0
0
3
6
9
12
15
18
21
24
Interpregnancy Interval (mo)

Figure 10.

Prevalence of Small for Gestational Age According to Interpregnancy Intervals by Race and Hispanic Origin of Mother

Indiana, 1994-1998 Singleton Live Births